

Attorney Docket No.  
033082RC003

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PATENT

1765 AF #23  
12/31/01

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Applicant: Kenichi Nanbu, et al. )  
)  
Appln. No.: 09/233,073 )  
)  
Filed: January 19, 1999 )  
)  
For: METHOD OF ETCHING )

Examiner: L. Vinh

Group Art Unit: 1765

TRANSMITTAL OF APPELLANTS REPLY BRIEF ON APPEAL

Commissioner of Patents  
Washington, DC 20231

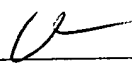
Sir:

Attached are three original sets of Appellants Reply Brief on Appeal, filed in response to the Examiner's Answer mailed October 23, 2001.

If any fees are necessary with respect to this filing, please charge them to Deposit Account No. 02-4300, and notify the undersigned attorney by telephone.

Respectfully submitted,  
SMITH, GAMBRELL & RUSSELL, LLP

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Date: December 21, 2001



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**APPELLANTS REPLY BRIEF ON APPEAL**

**APPELLANTS REPLY BRIEF**

This is in response to the Examiner's Answer which was mailed on October 23,  
2001.

**(1) Appellants Reply to the Examiner's Real Party in Interest**

No change from Brief on Appeal.

**(2) Appellants Reply to the Examiner's Related Appeals and Interferences**

No change from Brief on Appeal.

**(3) Appellants Reply to the Examiner's Status of Claims**

No change from Brief on Appeal.

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(4) Appellants Reply to the Examiner's Status of Amendments

No change from Brief on Appeal.

(5) Appellants Reply to the Examiner's Summary of Invention

No change from Brief on Appeal.

(6) Appellants Reply to the Examiner's Issues

No change from Brief on Appeal.

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(7) Appellants Reply to the Examiner's Grouping of Claims

On the basis that the regrouped claims are claims that depend from one or more claims considered to be allowable (as set forth in the Brief) no rebuttal is made herein regarding the regrouping.

(8) Appellants Reply to the Examiner's Claims Appealed

No change from Brief on Appeal.



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(9) Appellants Reply to the Examiner's Prior Art of Record

Appellant notes that the three references are classifiable as "prior art of record relied upon in the rejection of the claims under appeal" as additional references have been made of record during the application prosecution.

(10) Appellants Reply to the Examiner's Grounds of Rejection.

In the Examiner's Answer there is the repeated assertion that a motivating factor for combining Collins et al. and Szwejkowski et al. is that "Szwejkowski states that using the gaseous components/gas flow rate of his invention will not result in the undesirable formation of particles on the wafer surface and will not condense at room temperatures in the lines". However, there is lacking in the Examiner's Answer a response to the earlier raised arguments of Appellants that the particle avoidance/no condensation discussion in Szwejkowski et al. is strictly limited to the chlorine and oxygen bearing gas used in Szwejkowski being a gas having a higher purity availability and a higher vapor pressure than the  $\text{BCl}_3/\text{Cl}_2$  prior art etch system gas.

For instance, as described in column 1, lines 39-44 of Szwejkowski et al, it is the "low vapor pressure" of  $\text{BCl}_3$  which is considered to create a line condensation problem. Vapor pressure is a unique characteristic of a liquid and depends only upon temperature. Therefore, the discussion in Szwejkowski concerning avoiding condensation is not in any way directed at different flow rate consequences but rather simply the replacing of a low

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vapor pressure material with another material at a higher vapor pressure less susceptible to line condensation. The foregoing suggests away from the assertion of the Examiner that one of ordinary skill in the art would have been motivated to utilize the flow rate of Szejkowski et al. in Collins to (i) avoid particle formation and (ii) avoid line condensation.

Reference is also made in the Examiner's Answer that an additional motivating factor is considered to exist in the discussion of Collins of etching polysilicon using Chlorine at "high pressure" (col. 22, lines 46, 47) and the assertion that Collins suggests that a higher gas flow rate is preferred at high pressure (col. 9, lines 43-45). Appellants note that the discussion in col. 22, lines 46,47 already indicates an associated "high pressure" flow rate, which, as acknowledged on page 4, lines 12-14 of the Examiner's Answer (referencing col. 22, lines 45-48), is a rate that fails to disclose the claimed invention.

Also, the disclosure in Column 22, lines 46-48 of Collins pertains to the "Three Electrode Configuration" described (see column 21, lines 43-50) as "affording process control and enhancement" in the disclosed Collins system. Reference is again made to the discussion in Appellants Brief bridging pages 11 and 12, wherein the differences in use between the cathode in Collins and Szwjkowski et al. are outlined, and how those differences carry over to relative differences in flow rates. Reference is also made to the background discussion on page 1 of the present specification (lines 21-27 ) which sets

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forth:

In most cases, an inductive coupled plasma processing system capable of operating at a low process pressure on the order of several mTorr is employed for carrying out a polysilicon film etching process because the process pressure of a conventional diode parallel-plate plasma etching system is excessively high and the diode parallel-plate plasma etching system is unable to etch the surface of the polysilicon film in a sufficiently high uniformity.

The noted provisions in Collins are respectfully submitted to be insufficient to alter the underlying fact that Collins, relative to Szwjkowski et al., uses an entirely different means to generate the plasma means, generates its plasma at a different location, and utilizes a different technique in having etching gas reach the wafer surface (i.e., diffusion v. electrical attraction forces).

(11) Appellants Reply to the Examiner's Response to Argument.

Reference is made to Appellants Reply set forth above in numbered paragraph (10).

**CONCLUSION**

For the reasons already of record, and further in view of the remarks set forth above, Appellants respectfully submit that the rejections of the claims are therefore overcome. Appellants therefore respectfully request that the application is now in


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condition for immediate allowance. Allowance of the application is respectfully requested.

Respectfully submitted,

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